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TITLE

INSECT REARING EXPERIMENTS

Forest Insect Laboratory
Coeur d'Alene, Idaho

January 1, 1940 to December 31, 1940.

by

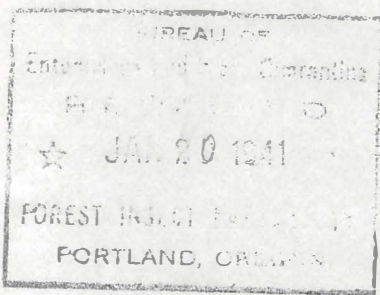
Henry J. Rust
Senior Scientific Aide

Forest Insect Laboratory
Coeur d'Alene, Idaho
January 13, 1941

Mr. Keen
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Forest Insect Laboratory
Coeur d'Alene, Idaho
January 13, 1941

Dr. F. C. Craighead
Washington, D. C.

Dear Dr. Craighead:

Enclosed are two copies of a report by Mr. Rust covering the rearing experiments conducted at our insectary during the past calendar year and describing the nature of the work conducted. The extra copy is for circulation through the eastern laboratories if you so desire.

Your comments and suggestions will be appreciated.

Respectfully yours,

JAMES C. EVENDEN
Senior Entomologist

Enclosures

cc to:
Mr. Miller
Mr. Keen
Mr. Furness

INSECT REARING EXPERIMENTS

Forest Insect Laboratory
Coeur d'Alene, Idaho
January 1, 1940 to December 31, 1940

The following report covers the insect-rearing operations at the Coeur d'Alene Laboratory insectary from January 1 to December 31, 1940. Only a small amount of material was carried over the winter of 1939-40. This consisted principally of spotless webworm (Hyphantria textor Harris) chrysalide and associated parasites. On May 18 infested material was received at the insectary for summer rearing from the Salmon River region near Riggins, Idaho. This consisted of ponderosa pine sections which had been attacked by secondary bark beetles and Melanophila species. Additional material of this type was received on July 26 for summer rearing and on October 15, 1940, for overwintering. On May 24 sixty white pine sections measuring 30 inches long and from 12 to 18 inches in diameter were placed in the insectary. These logs were heavily infested by the mountain pine beetle, and had been treated by spraying with various penetrating oils as a possible method of control. Confining these logs in the insectary until the final examinations of spraying results, July 8, 1940, saved a great amount of work in constructing separate cages for each log in event of leaving them in the woods. Emergence from the first lot of ponderosa pine sections received in May began on the 23rd of the month and was more or less continuous until the latter part of August.

Overwintering material for 1940-41 consists of sections of ponderosa pine infested by Melanophila species and associated parasites.

The following list gives the order, host and collection locality of the 1939-40 overwintering material and rearings conducted during the season of 1940:

LIST OF INSECTS REARED AT THE COEUR D'ALENE LABORATORY
INSECTARY WITH THEIR HOSTS AND HOST LOCALITY
JANUARY 1, 1940, TO DECEMBER 31, 1940

Order and Insect	Host	Locality
<u>COLEOPTERA</u>		
<u>Melanophila californica</u> V.D.	Ponderosa pine	Riggins, Idaho
<u>Melanophila gentilis</u> Lec.	" "	" "
<u>Monochamus obtusus</u> Casey	Douglas fir	" "
<u>Monochamus oregonensis</u> Lec.	" "	" "
<u>Xylotrechus undulatus</u> (Say.)	White fir (<u>A. grandis</u>)	" "
<u>Serropalpus barbatus</u> (Schad)	" " " "	" "
<u>Orthotomicus ornatus</u> Sw.	Ponderosa pine	" "
<u>Pityophthorus burkei</u> Blkm.	" "	" "
<u>Scandylis upiformis</u> Mann.	White pine	Kaniku N.F., Idaho
<u>Dendroctonus monticolae</u> Hopk.	" "	Coeur d'Alene N.F., Idaho
<u>HYMENOPTERA</u>		
<u>Atanycolus montivagus</u> (Cress.)	<u>Melanophila gentilis</u>	Riggins, Idaho
<u>Coeloides</u> sp. near <u>scolyti</u> Cush.	" "	" "
<u>Ibalia ensiger</u> Norton	<u>Sirex behrensi</u> ?	" "
<u>Sirex behrensi</u> Cush.	" "	" "
<u>Coeloides dendroctoni</u> Cush.	White pine	Coeur d'Alene N.F., Idaho
* <u>Sesioplex validus</u> (Cress)	<u>Hyphantria textor</u>	Hope, Idaho
<u>DIPTERA</u>		
* <u>Ernestia ampelus</u> Walk.	" "	" "
<u>Medeterus aldrichi</u> Wheeler	<u>D. monticolae</u>	Coeur d'Alene N.F., Idaho
<u>LEPIDOPTERA</u>		
* <u>Hyphantria textor</u> Harris	Alder & chokecherry	Hope, Idaho

* Overwintering 1939-1940

Detailed results of the various rearing experiments conducted during the season follow under their respective headings.

COLEOPTERA

Melanophila californica Van D.

In order to secure more information on the status of the Melanophila sp. infestation in ponderosa pine in the Salmon River region near Riggins, Idaho, additional material was secured by T. T. Terrell on May 16, 1940. A total of eight four-foot sections were cut from two standing infested ponderosa pine with sorrel foliage. These sections were brought to the Coeur d'Alene Laboratory insectary on May 18, 1940, and placed in rearing cages. Emergence of Melanophila californica began on June 25 and lasted until July 12. This emergence was almost a month earlier than from material collected in the fall from the same area and overwintered at the insectary. No M. gentilis was reared from these sections of infested ponderosa pine. A large series of cast larval skins along with newly developed adults of M. californica were secured and mailed to Washington, D. C.

Melanophila gentilis Lec.

While near Riggins, Idaho, on May 16, 1940, Mr. Terrell felled four additional ponderosa pine. These were unattacked trees with green foliage. Two of them were left intact and two were limbed, topped, and covered with brush. These trees were left undisturbed on the area until July 24, 1940, at which time four-foot sections were cut from both treatments and brought to the Coeur d'Alene Laboratory insectary on July 26, 1940, and placed in rearing cages. On July 31, 1940, one adult M. gentilis emerged from a section cut from one of the trees that had not been covered with brush. Seven more adults emerged from this section between August 1 and 19, 1940. This concluded the emergence from this cage,

although there were more larvae in pupal cells apparently in the prepupal stage. A check log from the same tree gave an emergence of five M. gentilis and a large number of larvae in apparently the same development as the caged log. A series of 20 of these larvae were placed in separate containers in the hopes of securing a forced emergence. One adult M. gentilis emerged on August 29, 1940, and the rest have remained in the prepupal larval stage with no feeding activities. No emergence of Melanophila sp. was secured from the sections that had been covered with the brush and no emergence of M. californica has been secured so far from any of the caged logs from the felled trees. The final emergence record of this material will not be known until some time in early July 1941. Additional infested ponderosa pine sections were secured from a standing tree near Lewiston, Idaho, September 5; and on October 15, 1940, from a tree felled by Mr. Evenden on August 15, 1940, near Riggins, Idaho. The completed emergence from all the infested ponderosa pine sections should give a good record of various times of attack and emergence, and if Melanophila californica will attack and breed in down slash on the Salmon River region in Idaho.

Cerambycidae - Wood Borers

Douglas Fir

From several small sections of Douglas fir cut from a tree with sorrel-colored foliage on May 16, 1940, near Riggins, Idaho, two species of wood borers were secured by rearing: Monochamus obtusus Gey. and Monochamus oregonensis Lec. Both species emerged between July 12 and August 1, 1940.

White Fir (Abies grandis)

Xylotrechus undulatus (Say.) was reared from a section of white fir from Riggins, Idaho, emergence occurring between July 12 and 24, 1940.

White Pine

Spondylis uniformis Mann.

A small section of infested white pine root was received from the Kaniksu National Forest on July 7, 1940. Hoping to secure more information on the larval form of Spondylis uniformis, this root section was placed in a closely woven screen cage and buried a few inches below the soil on the insectary floor. On October 28 the root was removed from the cage and examined for possible evidence of Spondylis uniformis. Under the thickest portion of the bark one short shallow tunnel was found, containing what was believed to be a partly developed adult of the above species. A small section of the wood containing the tunnel and specimen with cast larval skin was removed, wrapped in transparent tape, and mailed to Washington, D. C., on October 31, 1940.

White

Melandryidae

White Fir (Abies grandis)

Serronolpus barbatus (Schad).

Five specimens of this insect were reared from the same section of white fir from which the adults of Xylotrechus undulatus were secured.

Emergence occurred between June 10 and 17, 1940.

Bark Beetles

Orthotomicus ornatus Sw.

The eight four-foot sections cut from standing infested ponderosa pine on May 16, 1940, near Riggins, Idaho, were found to be heavily infested by a small secondary bark beetle, Orthotomicus ornatus Sw. This attack was in association with the flathead borer Melanophila californica Van Dyke.

Emergence of the bark beetles began on May 21, 1940, and averaged as high as 67 adults per square foot of bark surface from a section cut at 24 feet from the ground level. The start of emergence of the Orthotomicus adults was a month in advance of the emergence of Melanophila californica and lasted a week after the completing of the latter.

Pityophthorus burkei Blkm.

The larger limbs on the two ponderosa pine from which the eight sections were cut were infested by Pityophthorus burkei, emergence occurring during the latter part of May 1940.

DEFOLIATORS

LEPIDOPTERA

Spotless Webworm

Hyphantria textor Harris

Two large webs each containing larvae of this defoliator were collected during August 1939 near Hope, Idaho. One web from alder contained 154 larvae and one from chokecherry 241 larvae. These webs were placed in separate rearing cages at the Coeur d'Alene Laboratory insectary and the larvae supplied with their respective host plant.

Those that had reached the mature larval stage and had escaped parasitism began pupation on September 5, 1939. On the completion of pupation the following results were recorded:

	<u>Alder</u>	<u>Chokecherry</u>
Number of webs	1	1
Number of larvae	154	241
Transformation to pupae	62 -- 40.0%	116 -- 48.1%
Number parasitized by Hymenoptera sp.	66 -- 43.0%	63 -- 26.1%
Number parasitized by Diptera sp.	9 -- 6.0%	38 -- 15.8%
Number of larvae dying during rearing experi- ment.	17 -- 11.0%	24 -- 10.0%

After the above check of pupation was made, the cocoons of the webworm, Hymenoptera and Diptera parasites were placed in containers for overwintering. No extreme cold weather was experienced during the winter of 1939-40, which was no doubt a favorable condition for the overwintering material. The Diptera parasite Ernestia ampelus Walk. was the first to emerge, emergence beginning on April 24 and ending May 8, 1940. Next followed the Hymenoptera parasite Sesiopteryx validus (Gress.), which began emerging May 5, a little over a month in advance of the emergence of its host, the spotless webworm, and lasting until after the completion of the webworm emergence, which began on June 10 and lasted until June 16, 1940. The results of the total emergence of host and parasites are as follows:

Webworm: host	:No. of webworms:			:No. of :			:No. of :		
	Larvae:	Chrysa:	Emer-:	Diptera:	Emer-:		Hymenoptera:	Emer-:	
	:	lids	gence:	%	suparia:	gence:	%	cocoons	gence:
Alder	: 154	: 62	: 33	: 53.2	: 9)	: 45	: 95.7	: 66)	: 91
	:	:	:	:	:	:	:	:	: 70.5
Choke-	:	:	:	:	:	:	:	:	:
cherry	: 241	: 116	: 55	: 47.4	: 38)	:	:	: 63)	:
	:	:	:	:	:	:	:	:	:
	: 395	: 178	: 88	: 49.4	: 47	: 45	: 95.7	: 129	: 91
	:	:	:	:	:	:	:	:	: 70.5

The final result of the rearing experiment shows that while there was a great difference between the number of larvae collected in each web, the resulting emergence of the webworm moths was quite close, being 21.4 percent for the alder web and 22.8 percent for the chokecherry web. A very small loss occurred to the Diptera parasite Ernestia ampelus. This is a large Tachinid and no doubt has many hosts as well as a very extensive range being recorded from a number of localities in New York State. A heavy emergence was also recorded for the Hymenoptera parasite, which also probably has many other hosts. This rearing experiment tends to show that while the spotless webworm occurred in vast numbers on the infested area, it was subject to heavy parasitism as well as disease. These losses in addition to those no doubt occurring to the adult moths and their eggs in their natural surroundings apparently would have a decided effect on the spread of the infestation.

HYMENOPTERA

Parasites -

Atanycolus montivagus (Cress)

Coeloides sp.

Two species of Hymenopterous parasites, Atanycolus montivagus (Cress) and Coeloides sp., were reared from Melanophila gentilis larvae

in ponderosa pine slash. This emergence was recorded from the caged sections of ponderosa pine that had been felled on May 16, 1940, and left uncovered with brush. Parasitism by A. montivagus was quite heavy, while that of the Coeloides sp. was very light. Mr. C. J. W. Muesebeck believed this Coeloides was apparently an undescribed species or possibly an abnormal Coeloides scolyti Cush. No parasites were reared from the ponderosa pine sections that had been covered with brush.

Ibalia ensiger Norton

Adults of this species were reared from the ponderosa pine sections cut from standing trees near Riggins, Idaho, May 16, 1940. These trees were also heavily infested by Orthotomicus ornatus, Melanophila californica Van D., and Sirex behrensi Cush. From six sections of this infested ponderosa pine averaging 4' x 8", 38 Ibalia ensiger and 102 Sirex behrensi emerged between August 23 and September 10, 1940. As Ibalia ensiger has been reared from numerous conifers containing various species of Sirex including Sirex behrensi over various portions of the western United States, it is quite possible that it was also a parasite of Sirex behrensi in the infested ponderosa pine from Riggins, Idaho.

REARINGS FROM MATERIAL SUBJECTED TO LOW TEMPERATURES

Coeloides dendroctoni Cush.

Three small pieces of bark were removed from a section of mountain-pine-beetle-infested white pine that had been subjected to a temperature of -30° F. in connection with the low temperature studies being conducted at the Coeur d'Alene Laboratory. Fifty-four Coeloides

cocoons were present in the D. monticolae brood chambers in the removed bark. This material was placed in a rearing jar on May 15, 1940. Emergence of adult Coeloides began on May 30 and lasted until June 10, 1940. On June 12 a final check of the results showed that 49 adults had emerged from the cocoons, equal to 90.7 percent. This emergence coincided with emergence from sections of infested white pine that were being used as check logs for an oil-spraying control experiment.

Dendroctonus monticolae Hopk.

A section of mountain-pine-beetle-infested white pine that had been subjected to a temperature of -20° F. was placed in a rearing cage on June 7, 1940. On June 11, Medeterus aldrichii Wheeler began emerging, and on June 16 emergence of Dendroctonus monticolae started and continued until July 10, 1940. A total of 145 adult mountain pine beetles emerged from approximately three square feet of bark surface.

Respectfully submitted,

HENRY J. RUST
Senior Scientific Aide